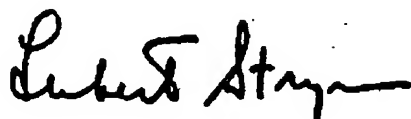


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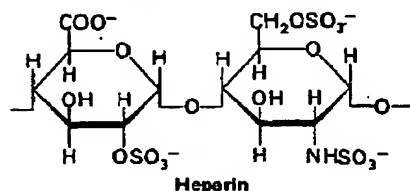
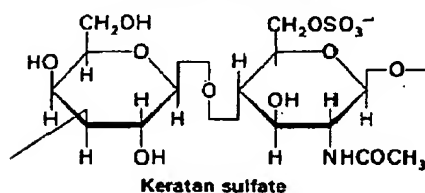
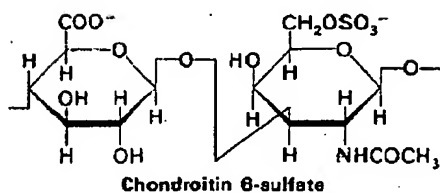
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278

Part II
PROTEIN CONFORMATION,
DYNAMICS, AND FUNCTION

joints and of other structures that are subject to mechanical deformation. *Glycosaminoglycans*, the polysaccharide chains in proteoglycans, are made up of *disaccharide repeating units* containing a derivative of an *amino sugar*, either glucosamine or galactosamine. At least one of the sugars in the disaccharide has a *negatively charged* carboxylate or sulfate group. Hyaluronate, chondroitin sulfate, keratan sulfate, heparan sulfate, and heparin are the major glycosaminoglycans (Figure 11-29). Heparan sulfate is like heparin except that it has fewer *N*- and *O*-sulfate groups and more *N*-acetyl groups.

In the proteoglycan from cartilage (Figure 11-30), keratan sulfate and chondroitin sulfate chains are covalently attached to a polypeptide backbone called the *core protein*. About 140 of these proteins are noncovalently bound at intervals of 300 Å to a very long filament of *hyaluronate*. This interaction is promoted by a small *link protein*. The entire complex has a mass of about 2×10^6 daltons and a length of several

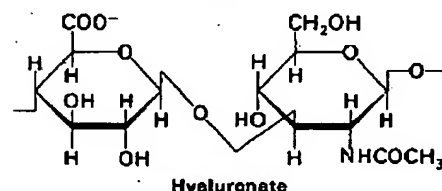
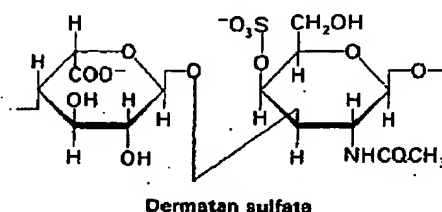
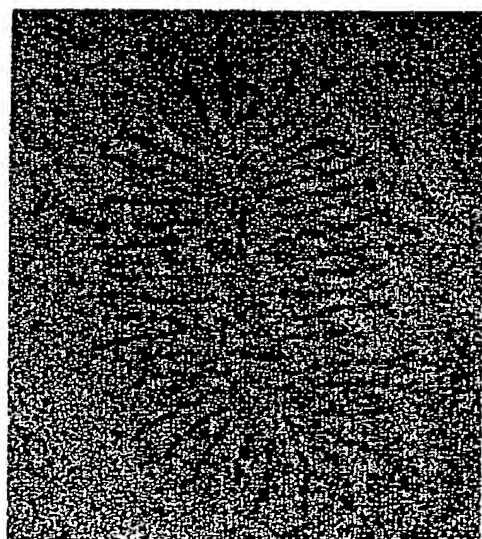
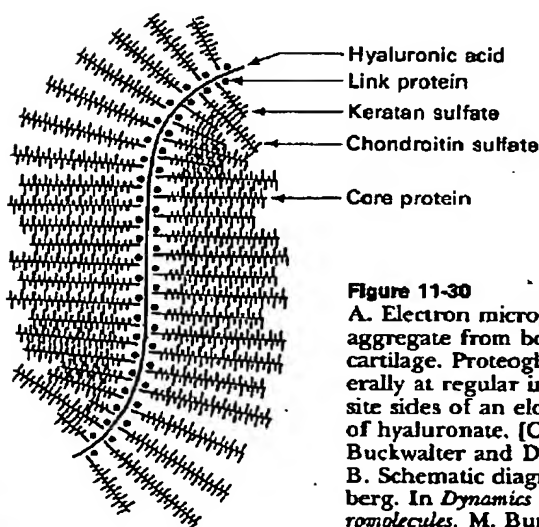


Figure 11-29
Structural formulas of the repeating disaccharide units of some major glycosaminoglycans. The negatively charged groups are shown in red.



A

0.5 μm



B

Figure 11-30

A. Electron micrograph of a proteoglycan aggregate from bovine fetal epiphyseal cartilage. Proteoglycan monomers arise laterally at regular intervals from the opposite sides of an elongated central filament of hyaluronate. [Courtesy of Dr. Joseph Buckwalter and Dr. Lawrence Rosenberg.]
B. Schematic diagram. [After L. Rosenberg. In *Dynamics of Connective Tissue Macromolecules*, M. Burleigh and R. Poole, eds. (North-Holland, 1975), p. 105.]